Cognitive laboratory experiences and beyond: some ideas for future research

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COGNITIVE LABORATORY EXPERIENCES AND BEYOND: SOME IDEAS FOR FUTURE RESEARCH

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1. Introduction

In the literature on questionnaire design and survey methodology, pre-testing is mentioned as a way to evaluate questionnaires (i.e. investigate whether they work as intended) and control for measurement errors (i.e. assess validity). As the American Statistical Association puts it (ASA, 1999, p. 11): "The questionnaire designer must understand the need to **pretest**, **pretest**, and then **pretest** some more." Clark and Schober (1992, p. 29) indicate why this need to pre-test: "Surveyors cannot possibly write perfect questions, self-evident to each respondent, that never need clarification. And because they cannot, the answers will often be surprising."

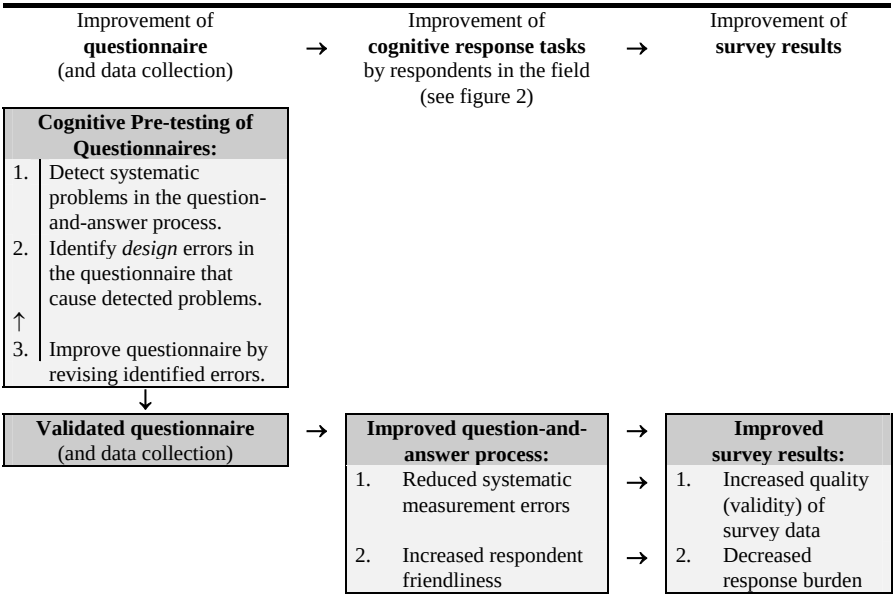
In the every-day practice of survey design, however, pre-testing and its results are not always accepted. A general feeling towards pre-testing is expressed by Converse and Presser (1986, pp. 51-52): "Pretesting a survey questionnaire is always recommended – no text in survey methods would speak against such hallowed scientific advice – but in practice it is probably often honored in the breach or the hurry. There is never the money nor, as deadlines loom, the time, to do enough of it. There is a corollary weakness that the practice is intuitive and informal. There are no general principles of good pretesting, no systematization of practice, no consensus about expectations, and we rarely leave records for each other. How a pretest was conducted, what investigators learned from it, how they redesigned their questionnaire on the basis of it – these matters are reported only sketchily in research reports, if at all. Not surprisingly, the power of pretests is sometimes exaggerated and their potentials often unrealized."

It has almost been twenty years since this text has been written. Although progress has been made, still several aspects of pre-testing as mentioned by Converse and Presser need to be addressed. In this paper, some personal ideas for future research will be discussed. These ideas have been presented at the 2003 QUEST Workshop in Mannheim. These ideas will be discussed in the sections 3 and 4, followed by a conclusion in section 5. But first, the general framework of pre-testing will be presented briefly in section 2.

2. The aim of cognitive pre-testing

Cognitive pre-testing is not an end in itself; it is aimed at improving the data quality, by improving the questionnaire. By means of small-scale pre-testing the questionnaire is validated, i.e. errors in the questionnaire that cause systematic errors in the question-and-answer process of the respondent in an interview setting are detected, explained and improved (in an iterative process). In this way, the questionnaire will be adapted to the question-and-answer process and becomes easier to answer, within a shorter period of time, and will be more respondent-friendly. Thus, resulting in reduced measurement errors, i.e. increased quality of survey data, and reduced respondent burden. This is the CASM[1] paradigm (see figure 1).

Figure 1: The CASM paradigm: Validating questionnaires and improving survey results by cognitive pre-testing



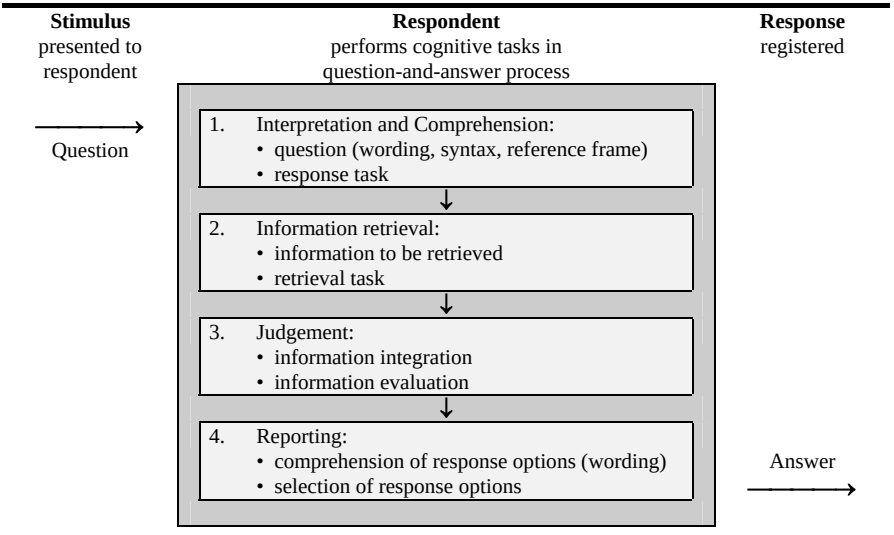
From: Snijkers (2002, p. 225).

1 CASM means Cognitive Aspects of Survey Methodology. For more information on CASM see Jabine et al. (1984), Hippler et al. (1987), Sirken et al. (1999), and Presser et al. (2004).

The question-and-answer process has been modelled by Tourangeau and Rasinki. In 1988 they presented a 4-stage model: comprehension, retrieval, judgement and reporting (see figure 2). This model "offered a view of the survey respondent as a question-and-answer system that carried out a series of mental operations, such as comprehension of what was required in response, retrieval of relevant information from memory, and decision-making to arrive at and provide answers to the survey interviewer's inquiry." (Jobe & Mingay, 1991, p.178.) According to Jobe and Mingay (1991, p. 178), "modelling the respondent's mental operations represented a vast change over the simple stimulus-response conception of respondent behaviour, that from the beginning of modern survey-taking governed the principles employed in designing survey instruments."

Methods to research the question-and-answer process, used in pre-test research are, among others: expert (re-)appraisal, focus groups, in-depth interviews (including thinking aloud and follow-up probing, meaning-oriented probing, paraphrasing, targeted test questions, and vignettes), and behavioural coding. These methods have been applied in cognitive laboratories to evaluate questionnaires to be used mostly in face-to-face interviews.

Figure 2: The question-and-answer process within the stimulus-response model of survey responding



From: Snijkers (2002, p. 7)

3. Needed Research

Now that we know the objectives of pre-testing, we can look at research that is needed in order to meet these objectives better. According to me, future research that is needed should address the following issues:

1. Assess the effectiveness of pre-test methods.
2. Develop empirically based guidelines for questionnaire design.
3. Adapt pre-test methods to new survey design issues, like Web surveys and Business surveys.

In this section these research issues will be discussed.

3.1. Assessing the effectiveness of pre-testing methods

Research with regard to assessing the effectiveness of pre-testing methods incorporates a number of issues that need more research. These issues deal with:

- reproducibility of methods,
- standardisation of terminology,
- new methods to research the question-and-answer process, and
- validity of methods.

As for reproducibility of pre-testing methods, Converse and Presser (1986, see section 1), already said what is needed: “general principles of good pretesting”, and “systematization of practice”. This is confirmed by Willis et al. in 1999 (p. 137), who discussed systematic schemes for describing the practise of cognitive interviewing methods. They concluded that “(…) no such schemes exist for use in cognitive interviewing research.”

Research concerning reproducibility of pre-testing methods is aimed at developing *Current Best Practices*. This concerns questions like:

- What pre-testing methods do we use, in what situations?
- How have they been applied? E.g.:
  - What probes are used in what situations, and what kind of findings do they produce? What are good probes?
  - Can pre-test methods be used in other modes, like the telephone and for pre-testing self-administered questionnaires?
- What findings do these methods result in?
- Who has to conduct pre-test research?
- How can these methods be improved?

Basically, aiming at Current Best Practices means a systematic description of the methods that currently are being used (see e.g. DeMaio et al., 1993, and Snijkers, 2002, chapter 4) and standardisation of these methods. To achieve this goal e.g. at the QDET Conference[2] a number of short courses were presented (Willis & Forsyth, 2002; Gerber, 2002; Mathiowetz, 2002). Most papers presented at the 2003 QUEST Workshop addressed this issue, describing own experiences in conducting pre-test studies and their results.

In order to get Current Best Practices, it is necessary for all pre-test researchers to speak the same language. Thus, also *standardisation of terminology* is needed. At the QUEST meeting, a good start has been made by Esposito (2003), who presented a draft lexicon of concepts.

Developing Current Best Practices is purely descriptive: how methods are being applied, and what terminology is being used. However, during the QUEST meeting we also concluded that most pre-testing methods address the first step in the question-and-answer process. These methods are not satisfactory regarding the investigation of the retrieval and judgement steps. Methods that help us to investigate these steps in more detail, should be developed.

Furthermore, it seems useful to incorporate in our toolbox other research methods, i.e. combining cognitive and non-cognitive methods that investigate the quality of questionnaires. A combination of results from several research approaches will result in even more information on the quality of questionnaires and will help to improve the crafting of survey questions. Here, methods like split-ballot MTMM (multi-trait multi-method) experiments (Saris, 1998; Saris et al., 2002) and interaction analysis (Maynard et al., 2002) can be mentioned.

The last aspect concerning the effectiveness of pre-test methods discussed here is the validity of pre-test research. This aspect deals with the question as posed by Groves in 1996 (p. 401-402): “How do we know what we think they think is really what they think?”, while discussing the usefulness of cognitive research:

1. Is there evidence that a discovered ‘problem’ will exist for all members of the target population? Is evidence sought that different problems exist for groups for whom the questions are more salient, more or less threatening, more or less burdensome?

2 International Conference on Questionnaire Development, Evaluation, and Testing Methods, November 14-17, 2002, Charleston, South Carolina: www.jpsm.umd.edu/qdet (Presser et al., 2004).

2. Do multiple measures of the same component of the question-answer technique discover the same problem (that is, exhibit convergent validity)?
3. When the problem is 'fixed', does replication of the techniques show that the problem has disappeared?
4. When the problem is fixed, does application of other techniques discover any new problem?
5. Is there evidence that the fixed problem produces a question with less measurement error than the original one?

These kinds of questions require experimental designs with contrasts of new and old questions and explicit measures of accuracy. Such studies are common to survey methodology for studies of measurement error and are needed to demonstrate the validity of pretesting techniques. At CASM II, Schwarz (1999, p. 71) also quoted Groves and was surprised to see that "in the light of the extensive applied work done in cognitive laboratories, (…) a systematic evaluation of the practical usefulness of cognitive laboratory procedures is still missing."

Research to assess the validity of pre-testing methods has been done by Fowler (2002, 2003). At the QUEST meeting he discussed the results of split-ballot experiments. Other research in this category has been presented by Rothgeb (2003) at the QUEST meeting. She discussed a vehicle for question testing in a field environment and conducting split-sample field experiments to compare different questionnaire designs: The Questionnaire Design Experimental Research Survey (QDERS). Yet another way to research the accuracy of measurements nowadays, is offered by the use of register data, and confront these data to survey data gathered in such experiments. In my opinion, more research in this field is needed, since it is essential with regard to the aim of pre-test research (as described in section 2, figure 1): Are pre-tested and accordingly revised questionnaires more valid measuring instruments, and do they produce better data, than questionnaires that have not been tested?

3.2. Developing guidelines for questionnaire design

In 1999, Willis et al. raised the following question: "What have we learned in general about questionnaire design, based on the thousands of cognitive interviews that have been conducted, that can be used to inform the crafting of survey questions?" The research that is mentioned in this section is aimed at answering this question.

Since the beginning of CASM and the development of cognitive laboratories, lots of questions have been pre-tested all over the world. This means that lots of situations have been encountered in which the question-and-answer process has been problematic. And

lots of recommendations have been presented to improve the questions. However, these situations and recommendations have not been systematically described. What is needed is a systematic review and description of these situations, findings and recommendations. On the basis of pre-test research *empirically based guidelines for questionnaire design* can be developed.

In the literature on questionnaire design lots of guidelines are presented (see e.g. Dillman, 2000; Czaja & Blair, 1996; Fowler, 1995; Foddy, 1993; Converse & Presser, 1986). However, in my view, they are not a precise enough tool for survey practitioners to develop good questions. And, sometimes guidelines are contradictory to each other. Still, a lot of practice and hands-on experience is needed to craft questionnaires. Thus, questionnaire design still is an art (Payne, 1980).

For instance, a common guideline is that question wording should be simple and as short as possible (Dillman, 2000). On the other hand Fowler (1995, p. 103) states that "a survey question should be worded so that every respondent is answering the same question." And "wording of the questions must constitute a complete and adequate script such that, when interviewers read the question as worded, respondents will be fully prepared to answer the question." However, a common dilemma in questionnaire design is: When to leave the interpretation of the question to the respondent (and have a simple and short question) and when to make it precise (and consequently have a long question containing a definition)? The present guidelines won't help in this situation.

The development of guidelines for questionnaire design should start with the development of a *question database*. This database should include question wordings and meta-information (like the origin of the question, the questionnaire it comes from, pre-test results, recommended improvements) regarding these questions. In stead of designing new questions from scratch all over again, survey practitioners may design questionnaires by selecting questions from this database. And, more information on the measurement instrument becomes available, making meta-data from several pre-test studies comparable, and having more indications on the quality of the questionnaire. Then, questions like "What kind of questions (with what characteristics) in what situations result in what kind of problems in the question-and-answer process, and how should these questions be reworded?" can be answered.

3.3. Adapting pre-test methods to new survey design issues

Traditionally, pre-testing methods are oriented at evaluating questionnaires for face-to-face interviews. However, since interviewer-administered face-to-face surveys are becoming too expensive and cheaper modes are being used more and more, pre-testing

methods for these modes should become available. This includes pre-testing methods for telephone surveys. A new mode that has a lot of attention nowadays is the Internet.

The Internet is a very cheap and easy to use mode. Questionnaires can be easily developed and put on the net. However, like with face-to-face surveys, when questionnaires are not properly developed, the quality of the data can be questioned. Therefore, *pre-testing methods for Web surveys* should be developed. Already Fowler (1995) and Dillman (2000) present ways for pre-testing self-administered questionnaires. Also pre-testing methods can be combined with usability testing (Couper, 2000). At the QUEST workshop in Mannheim Bäckström and Henningsson (2003) discussed this issue. They presented a checklist for designing electronic, self-administered questionnaires.

Apart from adapting pre-testing to new modes, pre-testing methods should also be adapted to 'new' populations. A population that needs more attention in questionnaire design are establishments. Over the years this population has been given attention with regard to questionnaire design and pre-testing (Phipps et al., 1993; Cox et al., 1995; ASA, 2000). However, during the QUEST meeting it became obvious that pre-testing questionnaires for business surveys still needs more attention. A number of papers addressed this issue. Giesen (2003) discussed an extensive program for pre-testing the Dutch Production Survey at statistics Netherlands. Jones (2003) discussed a framework for reviewing data collection instruments in business surveys at the British Office for National statistics. Response burden was discussed by Haraldsen (2003). He presented a conceptual model for response burden in business surveys.

4. More Needed Research

There is one aspect that is not addressed thus far. That is the underlying model of the question-and-answer process. In section 3, it was assumed that the response process is stable in time and stable among different socio-cultural groups in society. These issues will be addressed in this section.

4.1. The time dimension

Assuming that the response process in stable over time, means that once a questionnaire has been pre-tested and adapted according to the findings, it can be used over time. However, as we all know, language changes over time. And consequently, a questionnaire that once was approved to be a good measuring instrument needs improvements within, say, 5 to 10 years.

That the interpretation of questions may change over time, especially is a problem for continuous surveys. One way of dealing with this problem is by saying that the wording of a question Q in year T is the same stimulus in year T+n. However, in that case, although the wording has not changed, question Q may turn out to be a different stimulus, since it will be interpreted differently. Another way of looking at this problem is by making the questions comparable in concept: question Q has to measure concept C, and how can that be operationalised, i.e. how can question Q be reworded in such a way that the same concept is measured in year T+n? Now, what we need to find out is, when question Q does not measure concept C anymore.

To deal with the time dimension, we need *methods to continuously monitor the quality of questionnaires*. As for continuous surveys, and for re-use of questions in a question database (see subsection 3.2), pre-testing once is not enough. As Converse and Presser (1986, p. 51) indicate: "… the meaning of questions can be affected by the context of neighboring questions in the interview." And furthermore, "language constantly changes" making question wordings subject to changing interpretations. Fowler and Cannell (1996) argued that behaviour coding might be used in this way. Also split-ballot experiments can be used in this way. However, more research addressing this issue is needed to develop efficient monitoring methods.

4.2. The sociological dimension

Another aspect that needs to be researched is the way the response process differs among socio-cultural groups. In pre-test studies volunteering respondents are selected in such a way that people with different backgrounds are selected, e.g. with regard to gender, age, level of income, level of education, race, etc. Like with the time dimension, the interpretation of questions may not be the same for different groups in society. However, in general, one questionnaire is crafted for the whole of the sample (within one language group).

This is the 'one-size-fits-all' approach (Snijkers & Luppes, 2002). This approach has been improved by the Tailored Design Method (Dillman, 1978, 2000). Also Brög (2000) has developed a respondent-oriented design for surveys. His starting point is: "The researcher must adjust to the respondent, not the respondent to the researcher." This approach means tailoring the questionnaire.

At the 2003 QUEST meeting, difficulties in the response process and the interviewer-respondent interaction that are encountered while pre-testing a questionnaire with different cultural and racial/ethnic groups, have been discussed by Miller (2003). She concludes that the question-and-answer model should be extended with sociological

factors: “Fully understanding this relationship between socio-cultural phenomena and the response process is vital for (…) survey research occurring within international and multi-cultural contexts.”

5. Conclusions

In sections 3 and 4 a number of research issues have been discussed. However, it may be clear that not al issues can be addressed. So, we need to prioritise: what is most urgent? According to me, the following issues should be given most attention:

1. More split-ballot experiments, on a continuous basis (see subsection 3.1).
2. The development of guidelines for questionnaire design, following from a question database (see subsection 3.2).
3. The development of Current Best Practices, starting with detailed descriptions of pre-test methods, the application of these methods, and terminology (see subsection 3.1).
4. The development of methods to continuously monitor the quality of questionnaires (see subsection 4.1)
5. Adapting pre-test methods to Web surveys, including pre-testing self-administered questionnaires and usability testing (see subsection 3.3).
6. Pre-testing business surveys (see subsection 3.3).

In this list of research issues, attention is given to the following aspects concerning pre-test research:

1. Improvement of the pre-test methods,
2. Improvement of the results of pre-test research (the recommendations),
3. Adapting pre-test methods to new survey design issues.

However, since we cannot control changes in language and society over time, we should tailor questionnaires and continue with pre-testing, pre-testing and pre-testing.

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